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CONTRIBUTIONS TO THE KNOWLEDGE OF THE HEMEROBIIDAE OF WESTERN NORTH AMERICA (NEUROPTERA)

By Waro Nakahara

Introduction

Dr. Charles P. Alexander [A] amassed a fine collection of the Hemerobiidae during his sixteen entomological expeditions to various parts of western North America, and this, together with the additional material of nearly similar magnitude belonging to the United States National Museum [USNM], forms the basis of the present paper. Forty species recognized in the entire material are documented, including five species that are described as new and another species that also may be new but is left unnamed for the present.

The geographical area covered is west of the 100th meridian in the United States, British Columbia, Alberta, and Yukon in Canada, and Alaska. Localities by states and provinces not previously recorded are marked with asterisks. The reference to the original description is given for each species and genus; the complete synonymy is to be found in Carpenter (1940).

Carpenter recognized 50 species of the Hemerobiidae as occurring in the entire Nearctic region. Later, Gurney (1948) and Parfin (1956) each added two species, and Nakahara (1960), one more. The addi-

tions made by the present study bring the total of the named species to 60. It is notable that as many as 57 of this number are known to occur in the area defined above. Western North America is thus a veritable treasure house of the Hemerobiidae, and it seems likely that further exploration may bring to light more new species, especially of *Sympherobius*, which obviously is collected inadequately, and of *Kimminsia*, which seems exceptionally rich in the area.

My cordial thanks are due to Dr. Charles P. Alexander and Dr. Marion E. Smith for their kindness in submitting the Alexander collection to me for study. The major part of this collection has been returned to the Entomological Department, University of Massachusetts, Amherst, Mass., except the type specimens, which have been sent to the United States National Museum at the suggestion of Dr. Alexander. The examination of the United States National Museum material was made possible through the kindness of Dr. Oliver S. Flint, Jr., and Dr. Ashley B. Gurney, to whom I wish to express my sincere appreciation. The whole of this material has been returned to the Museum.

Family Hemerobiidae

Subfamily Hemerobiinae [1]

Genus *Sympherobius* Banks

Sympherobius Banks, Proc. Ent. Soc. Washington, vol. 6, p. 209, 1904.

The material before me contains ten species of this genus, including two that are new, while the following six species previously recorded are missing: *S. umbratus* Banks, *S. arizonicus* Banks, *S. pictus* (Banks), *S. limbus* Carpenter, *S. similis* Carpenter, and *S. distinctus* Carpenter. Most of these six species are known only from a unique type or at most from a few specimens.

Sympherobius californicus Banks

Sympherobius californicus Banks, Trans. Amer. Ent. Soc., vol. 37, p. 346, 1911.

California: Alameda Co., Marin Co., San Jose, Benicia [USNM]. *Oregon: in Blue Mts. [USNM].

Sympherobius bifasciatus Banks

Sympherobius bifasciatus Banks, Trans. Amer. Ent. Soc., vol. 37, p. 347, 1911.

*Utah: Logan [USNM].

[1] According to my studies on genitalic characters (1960), the family Hemerobiidae is divisible into two subfamilies, Hemerobiinae and Notiobiellinae, with all the Nearctic genera belonging to the former subfamily.

***Sympherobius angustus* (Banks)**

Hemerobius angustus Banks, Trans. Amer. Ent. Soc., vol. 30, p. 102, 1904.

*Nevada: Mt. Charleston near Las Vegas [A]. *California: Yosemite Park [A]. Washington: Mt. Rainier [A]. Utah: Logan [USNM]. Colorado: Cheyenne Canyon [USNM]; Bierstadt Lake in Rocky Mountain National Park [A]. New Mexico: Las Vegas [USNM].

The head of this species was described by Carpenter as "dark brown, almost black." In many specimens, especially of small size, it is much lighter, often yellowish, with a large dark patch on frons below the antennae. I have dissected the male genitalia of a few specimens with the yellowish head and satisfied myself that they are not separable from *S. angustus*.

***Sympherobius stangei* Nakahara**

Sympherobius stangei Nakahara, Mushi, vol. 34, p. 16, 1960.

*Colorado: Nymph Lake, Rocky Mountain National Park, 1 female [A].

The specimen completely agrees with the unique type of *S. stangei*, except that it is slightly smaller (length of forewing 6 mm. against 7 mm. in the latter). The original description is quoted here for the benefit of those to whom it may not be easily accessible:

Head yellowish brown, clypeus darker, palpi fuscous black, antennae fuscous black with paler basal joint. Forewing rather narrow, but much less so than in *angustus*, and fully rounded apically. Membrane colorless, broadly fuscous black along apical to outer margin; all veins behind R_1, except basal part of Cu_2, distal part of first anal and basal half of second anal, broadly marked with fuscous black; cells thus strongly marked out are clear-colorless, not containing any spot. Hindwing less strongly margined with fuscous, veins dark but unmarked.

Two branches to Rs in forewing, with radial crossvein between R_{4+5} and R_1 before the origin of R_{2+3}; first fork of Cu_1 distal to crossvein m-cu.

Length of forewing, 7 mm; width 2.5 mm.

Holotype: specimen lacking abdomen, Barton Flats, San Bernardino Co., California, July 22, 1953 (Lionel A. Stange).

This is a large and beautifully marked species, perhaps related to *occidentalis* (Fitch). The striking markings and venational characters of forewing alone may be sufficient for the recognition of this new species.

***Sympherobius brunneus*, new species**

FIGURE 1; PLATE 1 (FIGURE 1)

Holotype ♂, Miami Ranger Station (elevation 5000 ft.), Mariposa Co., Calif., July 5, 1945. Paratopotype ♂, July 1, 1954. Both collected by H. P. Chandler. Right forewing (dry) and dissected parts of genitalia (in balsam) of holotype mounted on two slides. Paratopotype is without left forewing; terminal abdominal segments in glycerol in small vial on the same pin. USNM type 66174.

Face yellow, vertex slightly brownish; palpi dark brown; antennae dark brown with yellow first joint. Pronotum yellow medially, narrowly brown on sides; meso- and matanotum yellow with light-brown scuta. Legs pale yellow. Abdomen light brown.

Forewing elongate oval with rounded apex, 5 mm. in length and 2 mm. in width; costal area narrow; membrane nearly uniformly tinted with brown, without maculation; venation dark brown, longitudinal veins sparsely streaked with hyaline. A short radial crossvein before origin of R_{2+3}; inner gradates disjointed in middle, the

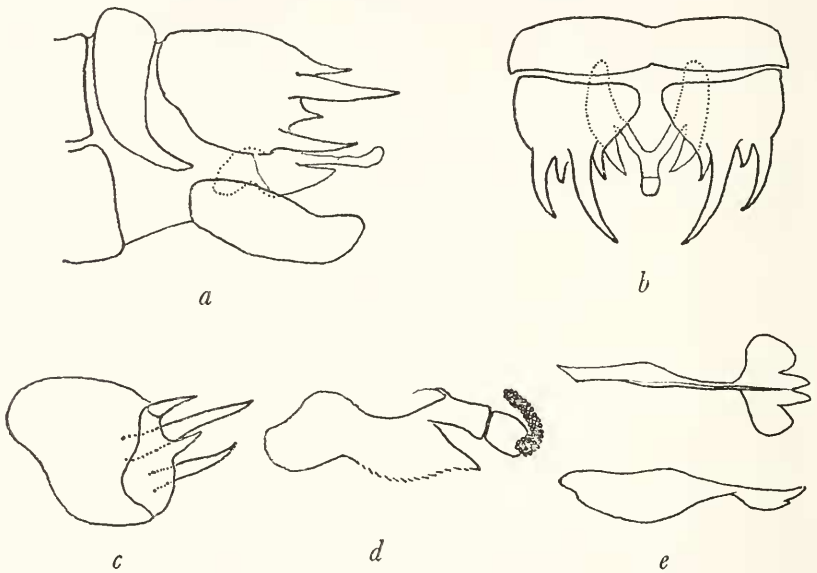

FIGURE 1.—*Sympherobius brunneus*, new species: *a*, terminal abdominal segments, lateral view; *b*, the same, dorsal views; *c*, anal plate, internal lateral views; *d*, tenth sternite, lateral and slightly dorsal view; *e*, parameres, dorsal (above) and lateral view (below).

upper two and lower two each on a straight line; Cu_1 forked beyond crossvein m-cu. Hindwing membrane hyaline, tinted with brownish only in costal area, especially in pterostigmatic region.

Male genitalia: Anal plate with four distal processes, resembling those of *S. angustus*, the first process from top (in lateral view) fairly long, the second the longest and most stout, the third the shortest, and the fourth the second longest. Tenth sternite with very broad lateral "wing," which in lateral view appears roughly triangular with pointed distal apex. Parameres with long fused part, distal lobes parted at apex, forming an acutely narrow median incision; lateral flaps broader anteriorly than posteriorly.

The brown-tinted membrane of forewing without maculation renders this species unique among the Nearctic *Sympherobius*. In order to include this species, Carpenter's key may be modified by introducing a new couplet 1′ after couplet 1 (forewing with radial crossvein):

1′. Forewing membrane practically uniformly tinted with brown, without markings . . . . . **S. brunneus**
Forewing membrane with brown or grey markings . Carpenter's couplet 2

***Sympherobius barberi* (Banks)**

Hemerobius barberi Banks, Proc. Ent. Soc. Washington, vol. 5, p. 241, 1903.

Arizona: Williams, paratype no. 6798 [USNM]. Utah: Provo [USNM]. Texas: Kerrville and San Antonio [USNM].

***Sympherobius perparvus* (McLachlan)**

Hemerobius perparvus McLachlan, Ent. Monthly Mag., vol. 6, p. 22, 1869.

*Utah: Tooele Co. [USNM]. California: Redding and Red Bluff [USNM]. Texas: Kerrville and Rankin [USNM].

***Sympherobius beameri* Gurney**

Sympherobius beameri Gurney, Ann. Ent. Soc. Amer., vol. 41, p. 220, 1948.

California: Rosamond, paratype no. 58600 [USNM].

***Sympherobius killingtoni* Carpenter**

Sympherobius killingtoni Carpenter, Proc. Amer. Acad. Arts Sci., vol. 74, p. 238, 1940.

Arizona: Williams [USNM]. New Mexico: Las Vegas, paratype no. 55224 [USNM].

***Sympherobius texanus*, new species**

Figure 2; Plate 1 (Figure 2)

Holotype ♂: Kerrville, Texas, May 1954. Allotopotype ♀, and 1 paratopotype (without abdomen): June 1954. All collected by L. J. Bottimer. Right forewing (dry) and dissected parts of genitalia (in balsam) of holotype mounted on two slides. USNM type 66175.

Face yellow, vertex somewhat more brownish. Antennae brown, darker toward apex. Pronotum pale brownish, with faint indication of yellowish median streak; meso- and metanotum yellow, with a large brownish patch on each side of metanotum. Abdomen yellowish, darker toward apex.

Forewing slender, 3 mm. in length, 1.25 mm. in width, but broadly rounded beyond middle, and hindmargin nearly straight, not curved out at the region of cubital forks; costal area very narrow. Membrane predominantly pale brown because of the more or less diffuse macula-

tions, without any distinct blotch; venation pale brown, only outer gradates slightly and inner gradates strongly marked with brown, the latter forming the only conspicuous marking; apical and outer margins very narrowly dark brown with many pale interruptions. Radial crossvein absent.

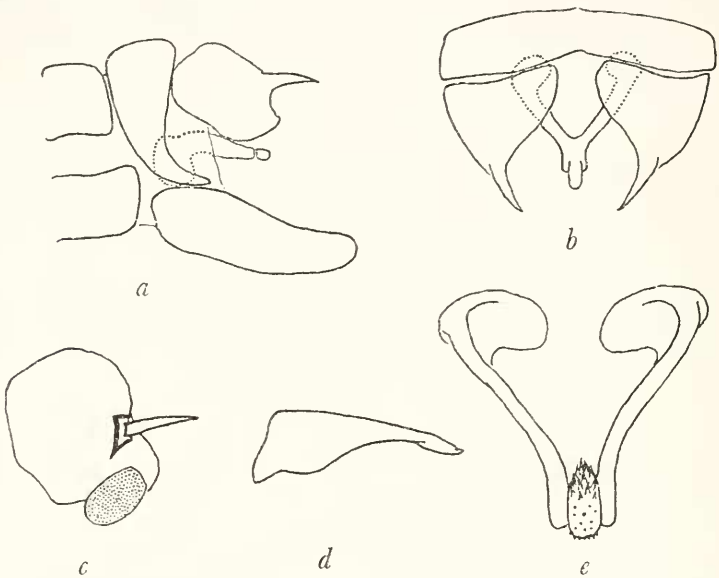

FIGURE 2.—*Sympherobius texanus*, new species: *a*, terminal abdominal segments, lateral view; *b*, the same, dorsal view; *c*, anal plate, internal-lateral view; *d*, parameres, lateral view; *e*, tenth sternite, dorsal view, with aedeagus bent posteriorly.

Male genitalia: Anal plate with ventroposterior angle slightly produced in lateral view; process single, fairly long, and straight. Tenth sternite with ventroproximal part of lateral "wing" expanded into a very large roundish flap. Parameres with the expanded distal part rounded on margin, without projecting middle arm.

This species will fit into a modification of couplet 9 (species without radial crossvein) in Carpenter's key:

9. Forewing membrane predominantly brown . . . . . 9′
Forewing membrane predominantly hyaline . to 10 of Carpenter's key
9′. Forewing narrowed toward apex and hindmargin rounded out; larger species: forewing 4.5 mm. long . . . . . **S. arizonicus** Banks
Forewing broadly rounded toward apex and hindmargin straight; smaller species: forewing 3 mm. long . . . **S. texanus**, new species

Texanus belongs to Gurney's "*perparvus* group," which is characterized by the anal plate of the male bearing a single process and which includes *S. perparvus*, *S. beameri*, and *S. killingtoni*. Of these the latter

may be the closest, but *S. texanus* can be distinguished readily by the very much smaller size and the brownish forewing without blotchy markings.

Genus *Pseudomicromus* Krüger

Pseudomicromus Krüger, Stettin Ent. Zeit., vol. 83, p. 172, 1922.

This genus, originally raised on the basis of ambiguous venational characters, has been reinstated by genitalic studies (Nakahara, 1960, p. 30). It is separated from other genera of the *Micromus* group by the paired aedeagus and by the absence of supraedeagal plate in the tenth sternite in the male. The material examined contained all the species that hitherto have been recorded.

Pseudomicromus angulatus (Stephens)

Hemerobius angulatus Stephens, Illustr. British Ins., vol. 6, p. 106, 1836.

South Dakota: Black Hills [A]. Colorado: Steamboat Springs [USNM].

Pseudomicromus variolosus (Hagen)

Micromus variolosus Hagen, Proc. Boston Soc. Nat. Hist., vol. 23, p. 284, 1886.

California: San Bernardino Mts. [A]. Colorado: Cheyenne Canyon [USNM]. Arizona: Chiricahua Mts. [A]; Tucson [USNM].

Pseudomicromus subanticus (Walker)

Hemerobius subanticus Walker, Neuropt. British Mus., pt. 2, p. 282, 1853.

California: Redding [USNM]. Arizona: Chiricahua Mts. [A]. Texas: Brownsville [USNM].

Genus *Stenomicromus* Krüger

Stenomicromus Krüger, Stettin Ent. Zeit., vol. 83, p. 171, 1922.

The dorsally spine-beset single aedeagus and the huge distal process of the anal plate are diagnostic of this genus. Parameres are separated, connected with each other only by a short bridge near base. The genus consists of the genotype, *S. paganus* of Europe, and its Nearctic counterpart, *S. montanus*.

Stenomicromus montanus (Hagen)

Micromus montanus Hagen, Proc. Boston Soc. Nat. Hist., vol. 23, p. 279, 1886.

Alberta: Waterton Lakes National Park [A]. British Columbia: Alaska Highway [A]. Washington: Olympic National Park, Mt. Rainier, and Mt. St. Helena [A]. *Oregon: Wallowa Mts. and Willamette National Forest [A]. Colorado: Dream Lake and Glacier Creek in Rocky Mt. National Park, Gothic [A]. California: Castle Crags [A].

Genus *Ameromicromus* Nakahara

Ameromicromus Nakahara, Mushi, vol. 34, p. 33, 1960.

This genus is endemic in North America, consisting of a single species, *A. posticus*. It is well characterized by the presence of a large subquadrate supraedeagal plate in the tenth sternite, which covers the aedeagus dorsally like a hood, and by the completely fused parameres, the apical two-thirds of which is in the form of a long pointed process and the basal one third, in that of a thin blade (Nakahara, 1960, p. 33). Krüger's *Paramicromus* is a homonym.

Ameromicromus posticus (Walker)

Hemerobius posticus Walker, Neuropt. British Mus., pt. 2, p. 283, 1853.

*Washington: St. Andrews Creek, 3800 ft., Mt. Rainier, July 17, 1953, a single male [A].

Genus *Hemerobius* Linnaeus

Hemerobius Linnaeus, Systema naturae, ed. 10, vol. 1, p. 549, 1758.

All but two (*H. nigrans* and *H. alpestris*) of the previously recorded species of this genus are represented. There is an additional species in the USNM collection that I am unable to identify.

Hemerobius humulinus Linnaeus

Hemerobius humulinus Linnaeus, Systema naturae, ed. 10, vol. 1, p. 550, 1758.

*Alaska: Teller [USNM]. *Washington: Mt. Hood and Merritt [A]. This common Holarctic species, previously recorded from British Columbia, seems to be very rare in western North America.

Hemerobius pacificus Banks

Hemerobius pacificus Banks, Trans. American Ent. Soc., vol. 24, p. 24, 1897.

British Columbia: Wellington [USNM]. California: Kings Canyon National Park [A]; Mill Valley, Van Damme State Park, Inverness, Berkeley, Carmel, and San Jacinto Mts. [USNM]. Utah: Plain City and Logan [USNM]. Arizona: White Mts. and Chiricahua Mts. [A]. New Mexico: Frijoles Canyon in Bandelier National Monument.

In spite of the great difficulty in distinguishing the female of *H. pacificus* from that of *H. neadelphus*, I referred all the specimens to the former, which show accentuated asymmetry of the apical part of forewing with more pointed apex.

Hemerobius neadelphus Gurney

Hemerobius neadelphus Gurney, Ann. Ent. Soc. America, vol. 41, p. 214, 1948.

British Columbia: Nanaimo and Wellington [USNM]. *Washington: Mt. St. Helena, Olympic National Park, and Mt. Rainier [A]. Oregon: Blue Mts. [A]. California: Lost Creek in Lassen National Park, Hatchet Pass near Burney, King's Canyon National Park, and

Sequoia National Park [A]; Mill Valley [USNM]. *Montana: Gallatin City]A]. *Colorado: Bierstadt Lake in Rocky Mountain National Park [A]. *Nevada: Washoe Co., and Kyle Canyon on Mt. Charleston [A]. *Arizona: Chiricahua Mts. [A].

There are over 50 females from various British Columbia, Alberta, California, Oregon, Utah, Wyoming, North Dakota, and Arizona localities that possibly may belong to this species but which I have not been able definitely to distinguish from *H. pacificus*. As Gurney (1948) stated, there seems to be no dependable differential feature in the female between the two species. On the whole, the forewing seems to be slightly more rounded at apex in *H. neadelphus* than in *H. pacificus*.

Hemerobius simulans Walker

Hemerobius simulans Walker, Neuropt. British Mus., pt. 2, p. 285, 1853.

Alaska: Teklanika River in Mt. McKinley Park [A]. British Columbia: Alaska Highway and Kootenay National Park [A]; Wellington [USNM]. *Oregon: Rogue River National Forest, Langdon Lake in Blue Mts., and Mt. Hood [A]. *California: Castle Lake [USNM]. *Montana: Avalanche Lake in Glacier National Park [A]. *Wyoming: Grand Teton National Park [A]. *Colorado: Clear Creek in Clear Creek Co.

Hemerobius ovalis Carpenter

Hemerobius ovalis Carpenter, Proc. Amer. Acad. Arts Sci., vol. 74, p. 205, 1940.

Alaska: Mt. McKinley National Park [A]. Washington: Mt. St. Helena [A]. Oregon: Rogue River National Forest [A]. California: Lassen National Park [A]. Wyoming: Yellowstone National Park [A]. *Colorado: Bear Lake in Rocky Mountain National Park and Gothic [A].

Hemerobius stigmaterus Fitch

Hemerobius stigmaterus Fitch, Noxious Ins. New York, reports 1 and 2, p. 93, 1856.

Alberta: Waterton Lake National Park [A]. Washington: Cle Elum [USNM]. Oregon: Bend, Lostine Valley in Wallowa Mts., Blue Mts., and Rogue River National Forest [A]. California: Yosemite National Park, Tioga Pass in Tuolumne Co., Nordon, and Lake Tahoe [A]; Fort Bragg, Miami Ranger Sta., Smith River, Castle Lake, San Jacinto Mts., Truckee, Keddie, and Nevada City [USNM]. *Montana: Glacier National Park [A]. Idaho: Twin Creek Camp in Salmon National Forest [A]. Wyoming: Teton Co. [USNM]. Colorado: Fraser [USNM]; Nymph Lake in Rocky Mountain National Park [A]. New Mexico: Chiricahua Mts. [USNM].

In a recent publication Tjeder (1960) synonymized *H. stigmaterus* under *H. stigma* Stephens, believing that the slight deviation in the shape of the median process of the tenth sternite (gonarcus) to be of

no specific value. He did not mention the difference in aedeagus, which to me seems rather important: *H. stigma* does not show the toothlike lateral expansion near the base that is present in *H. stigmaterus* (see Gurney, 1948, fig. 10, and Nakahara, 1960, fig. 96). The intraspecific range of variability in these structures has not been explored adequately, however, and further studies involving dissection of a large number of specimens seems necessary in establishing this possible synonymy.

Hemerobius conjunctus Fitch

Hemerobius conjunctus Fitch, Noxious Ins. New York, reports 1 and 2, p. 94, 1856.

Alaska: Mt. McKinley Park [A]. *Yukon: Alaska Highway [A]. Alberta: Banff National Park [A]; Mt. St. Piran [USNM]. *Washington: Olympic National Park and Mt. St. Helena [A]. *Oregon: Blue Mountains, Crater Lake, and Wallowa Mts. [A]. *California: Yosemite National Park [A]. *Idaho: Twin Creek Camp in Salmon National Forest [A]. Utah: Uinta Mts. and Cedar Breaks National Monument [A]. *S. Dakota: Black Hills [A]. Colorado: Rocky Mountains National Park, Gothic, Pike National Forest, and Arapaho National Forest [A].

Hemerobius kokaneeanus Currie

Hemerobius kokaneeanus Currie, Proc. Ent. Soc. Washington, vol. 6, p. 85, 1904.

*Alaska: Prince of Wales Is. [USNM]. *Alberta: Waterton Lake National Park [A]. Washington: Olympic National Park and Mt. Rainier [A]. *Oregon: Willamette National Forest and Mt. Hood [A]. *Wyoming: Teton Co. [USNM]. Colorado: Newcastle [USNM].

Hemerobius bistrigatus Currie

Hemerobius bistrigatus Currie, Proc. Ent. Soc. Washington, vol. 6, p. 79, 1904.

British Columbia: Wellington [USNM]. *Washington: Mt. Rainier [A]; Baring [USNM]. Oregon: Ochoco Mts. [A]. California: Lake Tahoe and Napa [USNM]. *Montana: Glacier National Park [A].

Hemerobius species

Alaska: Anchorage, one female [USNM].

Head, thorax, and abdominal tergites and sternites deep black, with a faint median light-colored streak on notum. Antennae dark brown; basal joint black. Forewing about 7 mm. in length; membrane uniformly greyish, unmarked except for a dark dot on crossvein m-cu, and a dark longitudinal streak in pterostigmatic region.

This may well be a new species.

Hemerobius dorsatus Banks

Hemerobius dorsatus Banks, Canadian Ent., vol. 36, p. 61, 1904.

Alaska: Alaska Highway [A]. *Yukon: Alaska Highway [A]. Alberta: Banff National Park and Jasper National Park [A]; Kannanaskis [USNM]. British Columbia: Alaska Highway [A]. *Oregon: Crater Lake [A]. *Montana: Beaverhead National Forest [A]. *California: Yosemite National Park and Inyo National Forest [A]. Colorado: Rocky Mountain National Park [A].

Genus *Brauerobius* Krüger

Brauerobius Krüger, Stettin Ent. Zeit., vol. 83, p. 171, 1922.

This genus is characterized by the exceedingly elongated anal plate of the male, which is rounded apically and bears no spinous projection (Nakahara, 1960, p. 50). Internal ventral margin of the plate is beset with numerous denticulate tubercles toward apex. It consists of three species: *G. marginatus* (Stephens), type species, *G. tristriatus* (Kuwayama), and *G. costalis* (Carpenter), the last being the sole Nearctic representative.

Brauerobius costalis (Carpenter)

Hemerobius costalis Carpenter, Proc. Amer. Acad. Arts Sci., vol. 74, p. 213, 1940.

Alaska: Fairbanks [USNM]. British Columbia: Yoho, Banff, and Waterton Lakes National Parks [A]. *Idaho: Boise National Forest [A].

Genus *Kimminsia* Killington

Kimminsia Killington, Monogr. British Neuropt., vol. 2, p. 254, 1937.

Eleven species of this genus are recognized in the material before me, and three of them are described as new. These three, though represented by a single specimen each, one unfortunately a female, are of such distinctive characters that I feel entirely safe in naming them. These were all collected by Dr. Alexander. There are three other species of this genus previously recorded from western North America but not found in the material: *K. fumata* Carpenter, *K. longipennis* (Banks), and *K. constricta* Parfin.

Kimminsia disjuncta (Banks)

Hemerobius disjuncta Banks, Trans. Amer. Ent. Soc., vol. 24, p. 25, 1897.

Alaska: Matanuska [USNM]. British Columbia: Kaslo [USNM].

Kimminsia coloradensis (Banks)

Hemerobius coloradensis Banks, Trans. Amer. Ent. Soc., vol. 24, p. 26, 1897.

Washington: Blue Mts. [USNM].

***Kimminsia involuta* Carpenter**

Kimminsia involuta Carpenter, Proc. Amer. Acad. Arts Sci., vol. 74, p. 219, 1940.

Alaska: Fairbanks [USNM]. British Columbia: Kokanee Mts. [USNM].

***Kimminsia brunnea* (Banks)**

Boriomyia brunnea Banks, Bull. Mus. Comp. Zool. Harvard, vol. 64, p. 333, 1920.

Alaska: Mt. McKinley Park [A]. Alberta: Jasper and Banff National Parks [A]. Colorado: Head of Elk Creek [USNM].

***Kimminsia pretiosa* (Banks)**

Boriomyia praetiosa Banks, Trans. Amer. Ent. Soc., vol. 34, p. 260, 1908.

Colorado: Clear Creek [USNM]. Utah: Uinta Canyon and Logan [USNM].

***Kimminsia schwarzi* (Banks)**

Hemerobius schwarzi Banks, Proc. Ent. Soc. Washington, vol. 5, p. 241, 1903.

*Alaska: Mt. McKinley Park [A]. California: Yosemite National Park [A]. Arizona: Williams [USNM].

***Kimminsia olympica*, new species**

FIGURE 3; PLATE 1 (FIGURE 3)

Holotype ♂, Deer Park (5400 ft.), Olympic National Park, Washington, July 17, 1948 (C. P. Alexander). Right forewing (dry) and

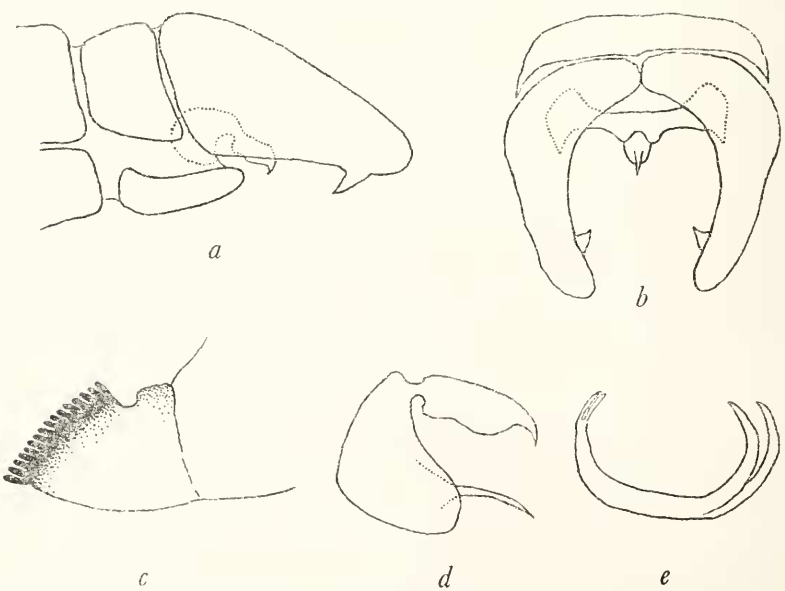

FIGURE 3.—*Kimminsia olympica* new species: *a*, terminal abdominal segments, lateral view; *b*, the same, dorsal view; *c*, apical comb of anal plate, internal view; *d*, tenth sternite, lateral view; *e*, parameres, lateral view.

dissected parts of genitalia (in balsam) mounted on two slides. USNM type 66176.

Face uniformly fuscous brown; vertex with two elongated pale patches divided by median fuscous brown longitudinal stripe; palpi and antennae brownish. Pronotum broadly brownish yellow medially, darker on sides. Mesonotum brownish yellow, fuscous brown on sides. Metanotum almost totally fuscous brown. Abdomen fuscous brown. Legs brownish yellow.

Forewing: Length 9.5 mm, width 3.5 mm, rather elongated with rounded apex; longitudinal veins pale with fuscous brown spots and short streaks; inner and outer gradates deeply fuscous and strongly margined with brown; basal crossveins m-cu and cu also fuscous and margined; membrane hyaline, with many small sagittate maculations in discal area; outer and hindmarginal area marked with scattered brownish patches; the markings forming a long brown fascia across the wing over inner gradates, one over the basal crossveins, a short one in hindmarginal area between the two, and a fourth, interrupted fascia over outer gradates. Hindwing hyaline; veins fuscous, except toward base, where they are pale.

Male genitalia: Anal plate long and slender, rounded apically, with a stout sharply pointed ventroapical process, which is bent strongly forward and somewhat inward. Tenth sternite rather narrow, dorsal bridge between "wings" short, narrowly produced posteriorly, bearing long and laterally compressed aedeagus over it; ventral process very long and slender. Parameres turned up at both ends, fused in middle; the separated basal parts short, and distal parts very much longer.

This species is like *Kimminsia fumata*, *K. constricta*, *K. pretiosa*, and *K. schwarzi* in having down-curved ventroapical process to anal plate, but the anal plate itself is much longer and more slender in this species, and the process is strongly bent forward and is sharply pointed. It is a rather conspicuous species with maculations roughly forming four transverse bands across the forewing.

Kimminsia posticata (Banks)

Boriomyia posticata Banks, Trans. Amer. Ent. Soc., vol. 32, p. 39, 1905.

*Yukon: Alaska Highway [A]. *California: Tuolumne Meadows in Yosemite National Park [A]. Utah: Logan [USNM].

Kimminsia alexanderi, new species

FIGURE 4; PLATE 1 (FIGURE 4)

Holotype ♂, Haines Highway, Alaska, July 5, 1952 (C. P. Alexander). Right forewing (dry) and dissected parts of genitalia (in balsam) mounted on two slides. USNM type 66177.

Face fuscous brown, with a narrow yellow transverse line along the

base of clypeus; vertex yellow; palpi brown; antennae brownish yellow, darker beyond middle. Pronotum brownish yellow, with fuscous-brown longitudinal stripe in middle and on sides; meso- and metanotum broadly yellowish medially, brownish on sides. Legs yellowish. Abdomen yellowish basally, brownish beyond middle.

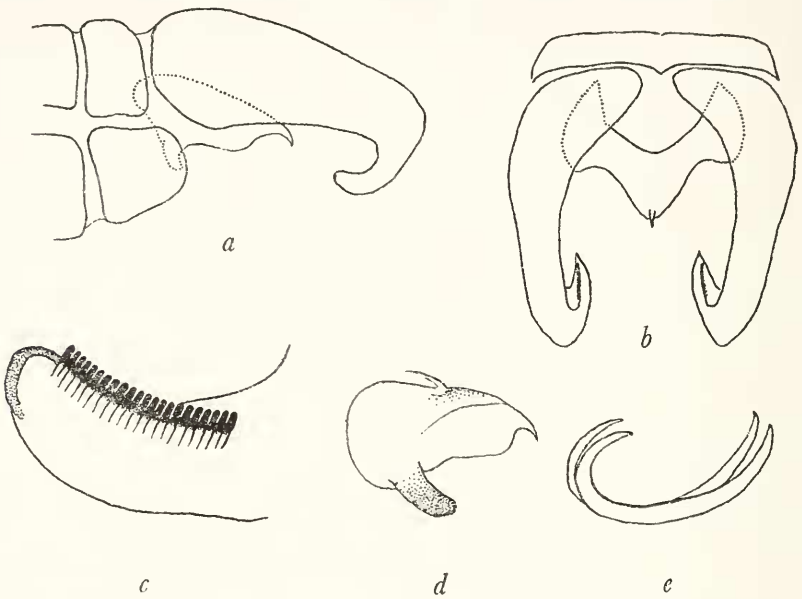

FIGURE 4.—*Kimminsia alexanderi*, new species: *a*, terminal abdominal segments, lateral view; *b*, the same, dorsal views; *c*, apical comb of anal plate, internal view; *d*, tenth sternite, lateral view; *e*, parameres, lateral view.

Forewing: Length 7 mm., width 3 mm.; apex rounded; membrane very slightly smoky, practically immaculate in discal area; outer marginal area down to the end of cubitus with alternate brownish and hyaline small patches; the patches larger in hindmarginal area from Cu_1 to hindmargin. A rather conspicuous dark-brown spot over the last crossvein of the inner gradate series. Longitudinal veins fuscous, interrupted with short pale streaks; crossveins of the same shade of fuscous. Hindwing slightly smoky with fuscous venation, which is paler toward base.

Male genitalia: Anal plate very long and narrow, distally curved roundly downward and then forward; apical part provided with a closely set series of short teeth on ventrolateral margin. Tenth sternite produced posteriorly into a large subtriangular lobe (in dorsal view), ending in a short pointed dorsoapical process; lateral "wings" broad, with a large lateroposterior process, which ends in inwardly curved obtuse apex. Parameres slender, strongly curved,

fused in middle and separated proximally and distally; the proximal lobes shorter than distal parts, all sharply pointed at ends.

The strongly curved ventroapical process of anal plate in this species reminds one of *K. posticata*, but anal plate is very much narrower in lateral view and the apical prolongation is only slightly more slender than the body of the plate. This species is very much smaller than *K. posticata*, and the forewing membrane is uniformly smoky in discal area, maculations being confined to postcubital area.

Kimminsia furcata (Banks)

Boriomyia furcata Banks, Psyche, vol. 42, p. 55, 1935.

Alaska: Toklat River [USNM], Haines Highway, Mt. McKinley National Park, and Richardson Highway [A]. Alberta: Jasper National Park and Kicking Horse Pass [A]. *British Columbia: Alaska Highway [A]. *Washington: Olympic National Park [A]. California: Yosemite National Park, Tioga Pass in Tuolumne Co. [A]. *Nevada: Lake Tahoe [A]. Colorado: Timber Creek Camp, Chambers Lake, and Monarch Pass in Rocky Mt. National Park. [A].

Kimminsia melaleuca, new species

Plate 1 (Figure 5)

Holotype ♀, Alaska Highway, Mile Post 720, Yukon Territory, July 2, 1952 (C. P. Alexander). Right forewing mounted dry on a slide. USNM type 66178.

Face shining black, brownish toward anterior margin of clypeus; vertex dull black. Antennae fuscous, almost black. Pronotum black, narrowly margined with brownish yellow anteriorly, with two ill-defined brownish-yellow longitudinal stripes submedially. Mesonotum black, with two brownish-yellow patches lateroposteriorly, each enclosing a short black longitudinal streak. Metanotum and abdomen black. Legs brownish yellow, femur broadly banded with dark brown toward both ends.

Forewing: Length 7 mm., width 3 mm., apex rounded. Veins black, interrupted with numerous white spaces; both series of gradates deep black, strongly margined with fuscous black, especially the posterior crossveins of the inner series; sagittate maculations of discal area strongly developed and mostly transversely confluent; outer and hindmarginal areas, distal to outer gradates, and behind Cu_1 decorated with large patches of alternate black and hyaline white. Maculations faint in costal space. Hindwing very distinctly smoky, with fuscous black venation; crossveins in pterostigmatic area conspicuously white.

The forewing of this black-bodied species is very striking because of the hyaline spots that appear so white owing to the whiteness of the

parts of the veins enclosed, in strong contrast to the deeply fuscous-black markings.

An attempt has been made to accommodate the three new species described above in Carpenter's key (1940, p. 215) and its partial modification by Parfin (1956, pp. 207–208).

Key to the Nearctic Species of *Kimminsia*

1. Pronotum with a conspicuous median yellowish stripe, bordered laterally with dark brown 2
   Pronotum without such a median stripe 10
2. Upper part of frons very dark brown, lower part yellowish or light brown with very abrupt transition . . . . . **K. coloradensis** Banks
   Frons more uniformly dark brown, or, if the upper part is darker than the lower, the transition is very gradual 3
3. Forewing with blackish-brown spots at distal m-cu crossvein and from Cu_1 to hindmargin 4
   Forewing with maculations more evenly distributed 5
4. Forewing nearly uniformly smoky in discal area; small species (forewing 7 mm.) . . . . . **K. alexanderi,** new species
   Forewing with some sagittate maculations in discal area; larger species (forewing 10 mm.) . . . . . **K. posticata** Banks
5. Anal plate of male with a very long dorsal process. . . . **K. furcata** Banks
   Anal plate of male without dorsal process 6
6. Anal plate of male with very long and slender apical process that is terminally expanded . . . . . **K. subnebulosa** (Stephens)
   Anal plate of male with short apical process 7
7. Process of anal plate strongly bent forward . . . **K. olympica,** new species
   Process of anal plate directed more or less straight downward 8
8. Process of anal plate short and bent inward. . . . . **K. constricta** Parfin
   Process of anal plate moderately long, not bent inward 9
9. Large species (forewing averaging 11 mm.), costal area broad. **K. involuta** Carpenter
   Smaller species (forewing averaging 9 mm.), costal area of moderate breadth . . . . . **K. disjuncta** (Banks)
10. Face, vertex, and pronotum deep black . . . . **K. melaleuca,** new species
    Face, vertex, and pronotum yellowish or light brown 11
11. Face, vertex, and pronotum with scattered red specks. **K. longipennis** Banks
    Face, vertex, and pronotum not so marked 12
12. Forewing without maculation . . . . . **K. brunnea** Banks
    Forewing with conspicuous maculations 13
13. Forewing without distinct transverse bands . . . . . **K. pretiosa** Banks
    Forewing with distinct transverse bands. 14
14. Mesonotum with dark-brown anterior border . . . . . **K. schwarzi** Banks
    Mesonotum uniformly light brown . . . . . **K. fumata** Carpenter

Genus *Wesmaelius* Krüger

Wesmaelius Krüger, Stettin Ent. Zeit., vol. 82, p. 170, 1922.

There is a single Nearctic species of this genus.

Wesmaelius longifrons (Walker)

Hemerobius longifrons Walker, Neuropt. British Mus., pt. 2, p. 291, 1853.

Oregon: Princess Creek Forest Camp on Odell Lake in Klamath Co. [A]. *Idaho: Twin Creek Camp in Salmon National Forest and Lolo National Forest [A]. *Montana: Glacier National Park [A]. Colorado: Cheyenne Mts. [USNM].

Genus *Megalomus* Rambur

Megalomus Rambur, Hist. Nat. Ins., Neuropt., p. 418, 1842.

Only one of the four Nearctic species of this genus is represented.

Megalomus moestus Banks

Megalomus moestus Banks, Trans. Amer. Ent. Soc., vol. 22, p. 314, 1895.

Arizona: Chiricahua Mts. [A and USNM].

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